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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/529,652	Applicant(s) FUSE, MASARU	
	Examiner Daniel G. Dobson	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) *2-4 and 25-27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 5-24,and 28-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 1,18,19,20,21,44, and 45** are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 4,779,266 to Chung et al. (*Chung.*)

As to **Claim 1**, *Chung* discloses an optical transmission system for optically transmitting one data signal (Fig. 1), comprising

pulse train generating means (Fig. 5) for converting the one data signal (1011) to a pulse train (output of gate 1213)), based on one encoding pattern that is uniquely predetermined corresponding to the one data signal (code in register 1212), and outputting the pulse train;

optical modulating means (1214) for converting the one pulse train output from the pulse train generating means to an optically modulated signal and outputting the signal (Fig. 1, S1);

an optical transmission path for transmitting the optically modulated signal that is output from the optical modulating means (Fig. 1, 141);

optical detecting means (Fig. 6, 211-213) for converting the optically modulated signal transmitted on the optical transmission path to an electrical signal and outputting the signal; and

data signal extracting means (Fig. 6, 1312-1315) for obtaining the pulse train from the electrical signal that is output from the optical detecting means based on a decoding patter that uniquely corresponds to the encoding patter and extracting the data signal (Claim 4, a unique code is associated with each stream.)

As to **Claim 18**, *Chung* discloses An optical transmission system for optically transmitting at least two data signals (Fig. 1), comprising

pulse train generating means (101-103 in cooperation with 121-123) for converting the at least two data signals to respective pulse trains, based on at least two encoding patterns that are uniquely predetermined corresponding to the at least two data signals (each of the codes are orthogonal to each other) , and outputting the pulse trains;

optical modulating means (121-123) for converting at least two pulse trains output from the pulse train generating means to optically modulated signals and outputting the signals;

an optical transmission path (141) for transmitting the optically modulated signals that are output from the optical modulating means;

optical detecting means (Fig. 6, photodiodes (P-D's)) for converting the optically modulated signals transmitted on the optical transmission path to electrical signals and outputting the signals (the signals are passed to the decoder); and

data signal extracting means (1315) for obtaining the pulse trains from the electrical signals that are output from the optical detecting means based on decoding patterns that uniquely correspond to the encoding patterns and extracting the data signals (Col. 4, ll. 61-3.)

As to **Claim 19,** *Chung* further discloses wherein the pulse train generating means comprises a plurality of pulse train generating portions (Fig. 1, see multiple transmitters) for converting a plurality of data signals to respective pulse trains that are of predetermined modulation types, based on encoding patterns each of which is predetermined corresponding to the data signals input and is different from one another (Each code is orthogonal, thus unique), and outputting the pulse train, and

wherein the optical modulating means comprises:

a plurality of optical modulating portions (Fig. 1, 121-123) that are provided corresponding to the pulse train generating portions and convert the pulse trains output from the respective pulse train generating portions to respective optically modulated signals and outputting the signals (Fig. 1, S1-S3), and

an optical combining portion (141, the signals are combined and transmitted over one optical channel) for combining the optically modulated signals output from the plurality of optical modulating portions and outputting a result to the optical transmission path.

As to **Claim 20**, *Chung* further discloses wherein the optical detecting means comprises an optical detecting portion (Each receiver of Fig. 1, has detectors illustrated in Fig. 6) for reconverting the optically modulated signals transmitted on the optical transmission path to electrical signals and outputting the signals (Fig. 1, optical to electrical transition), and

the data signal extracting means (Fig. 6) comprises a demodulating/separating portion for extracting the pulse trains from the electrical signals that are output from the optical detecting portion based on decoding patterns that uniquely correspond to the plurality of encoding patterns and demodulating the data signals (each code is orthogonal.)

As to **Claim 21**, *Chung* further discloses wherein the optical detecting means comprises:

an optical splitting portion (Fig. 1, the channels are optically split from the transmission medium to each receiver) for splitting the optically modulated signal transmitted on the optical transmission path to a plurality of signals and outputting the signals, and

a plurality of optical detecting portions (Fig. 1, photodiodes in each of 131-133) that are provided corresponding respectively to the plurality of optically modulated signals that are split and output by the optical splitting portion, and reconvert the optically modulated signals to electrical signals to output the signals, and

wherein the data signal extracting means (Fig. 1, 131-133) comprises a plurality of demodulating/separating portion that are provided corresponding respectively to the plurality of optical detecting portions and extract the pulse trains from the electrical signals that are output from the optical detecting portion based on decoding patterns that uniquely correspond to the plurality of encoding patterns and demodulate the data signals.

As to **Claim 44**, *Chung* discloses pulse train generating means (101-103 in cooperation with 121-123) for converting each of the at least one data signals to respective pulse trains, based on at least one encoding pattern that is uniquely predetermined corresponding to the at least one data signal (each of the codes are orthogonal to each other), and outputting the pulse train; and

optical modulating means (121-123) for converting the at least one pulse train output from the pulse train generating means to an optically modulated signal and outputting the signal to an optical transmission path (Fig. 1, 141.)

As to **Claim 45**, *Chung* discloses a receiver (Fig. 1, receiver side) apparatus for receiving an optically modulated signal that has been modulated with a pulse train obtained by converging at least one data signal, based on at least one encoding pattern that is uniquely predetermined corresponding to the at least one data signal (each signal has its own orthogonal code), via an optical transmission path (Fig. 1, 141), comprising:

optical detecting means (Fig. 6, photodiodes (P-D's)) for converting the optically modulated signals transmitted on the optical transmission path to

electrical signals and outputting the signals (the signals are passed to the decoder); and

data signal extracting means (1315) for obtaining the pulse trains from the electrical signals that are output from the optical detecting means based on decoding patterns that uniquely correspond to the encoding patterns and extracting the data signals (Col. 4, ll. 61-3.)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 5 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. in view of U.S. Patent Application Publication 2004/0066856 A1 to Forestieri et al. (*Forestieri.*)

As to **Claim 5,** *Forestieri* discloses a pulse compressing portion (Fig. 3, Optical Bandpass Filter) for receiving the optically intensity modulated signal transmitted in the transmission path, compressing a pulse width of a pulse train (the bandpass filter rejects the low frequency components of the signal, thus decreasing the rise/fall time) , and outputting a result.

wherein the optical detecting means comprises:

an optical detecting portion (Fig. 3, detector) for converting an optical signal output from the pulse compressing portion (bandpass filter) to an electrical signal and outputting the signal.

Chung and *Forestieri* are from the same art with respect to optical communications. Therefore, they are analogous art.

A person of ordinary skill in the art could have combined a pulse compressing portion with an optical receiver by known methods with the results of the combination being predictable. Therefore, at the time of the invention, it would have been obvious for a person of ordinary skill in the art to use a pulse compression portion and connect the optical detector to the output of the compression portion.

As to **Claim 6**, *Forestieri* discloses a filter portion (Fig. 2, LPF) for increasing the pulse width of the pulse train output form the pulse generating portion and outputting a result,

the optical modulating means comprises and optical modulating portion (MOD) for converting the pulse train output from the filter portion (LFP output connected to MOD) to an optically intensity modulated signal and outputting the signal (¶ 25,)

a pulse compressing portion (Fig. 3, Optical Bandpass Filter) for receiving the optically intensity modulated signal transmitted in the transmission path, compressing a pulse width of a pulse train (the bandpass filter rejects the low

frequency components of the signal, thus decreasing the rise/fall time) , and outputting a result.

wherein the optical detecting means comprises:

an optical detecting portion (Fig. 3, detector) for converting an optical signal output from the pulse compressing portion (bandpass filter) to an electrical signal and outputting the signal.

At the time of the invention, it would have been obvious to use a filter portion and a pulse compressing portion in an optical transmission system. The suggestion/motivation would have been to improve tolerance to chromatic dispersion (¶ 3.)

5. **Claims 7,8,10 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. in view of U.S. Patent 7,277,647 B2 to Gill et al. (*Gill.*)

As to **Claim 7**, *Gill* discloses wherein the optical modulating means (Fig. 1, 103) comprises an optical angle modulating portion for converting the pulse train output from the pulse train generating portion to an optically angle modulated signal and outputting the signal (Fig. 3, shows that the phase of the signal is modulated, phase modulation being a type of angle modulation,)

the optical detecting means (Fig. 1, 130) comprises:

an optical interference portion (Fig. 1, 132) for receiving an optically angle modulated signal transmitted on the optical transmission path and detecting correlation between adjacent bits of a pulse train (Col. 5, ll. 38-60,) which is

modulation information, so as to output two optical differential signals that have opposite polarities to each other and correspond to differential components of the pulse train (Fig. 3, signal I1 and I2,) and

an optical detecting portion (Fig. 1, balanced detector) for converting one of the optical differential signals that are output from the optical interference portion to an electrical signal and outputting the signal.

Chung and *Gill* are from the same art with respect to optical communications. Therefore, they are analogous art.

At the time of the invention it would have been obvious for a person of ordinary skill in the art to angle modulate the transmission signal and to use an interference portion to receive the signal. The suggestion/motivation would have been to take advantage of the benefits of minimum shift keying or phase shift keying (Col. 1, ll. 45-60.)

As to **Claim 8**, *Gill* further discloses wherein the optical interference portion comprises:

an optical splitting portion (Fig. 3, 303) for splitting the input optically angle modulated signal into two,

an optical delay portion (305) for supplying a predetermined optical delay amount to one or both of the optically angle modulated signals that are split and output from the optical splitting portion and outputting a result, and

an optical combining/splitting (309) portion for combining the other optically angle modulated signal that is split and output from the optical splitting

portion and an optically angle modulated signal that is output from the optical delay portion and splitting a result into two again so as to output optical differential signals having opposite polarities to each other.

The suggestion/motivation is the same as that used in the rejection for claim 7.

As to **Claim 10**, *Gill* discloses wherein the optical modulating means (Fig. 1, 103) comprises an optical angle modulating portion for converting the pulse train output from the pulse train generating portion to an optically angle modulated signal and outputting the signal (Fig. 3, shows that the phase of the signal is modulated, phase modulation being a type of angle modulation,)

the optical detecting means (Fig. 1, 130) comprises:

an optical interference portion (Fig. 1, 132) for receiving an optically angle modulated signal transmitted on the optical transmission path and detecting correlation between adjacent bits of a pulse train (Col. 5, ll. 38-60,) which is modulation information, so as to output two optical differential signals that have opposite polarities to each other and correspond to differential components of the pulse train (Fig. 3, signal I1 and I2,) and

an optical balance detecting portion (Fig. 3, balanced receiver) for reconverting the two optical differential signals that are output from the optical interference portion to respective electrical signals and for combining the two signals so as to generate and output a bipolar differential pulse train (Col. 5, ll. 60-3.)

At the time of the invention it would have been obvious for a person of ordinary skill in the art to angle modulate the transmission signal and to use an interference portion with a balanced receiver to receive the signal. The suggestion/motivation would have been to take advantage of the benefits of minimum shift keying or phase shift keying (Col. 1, ll. 45-60.)

As to **Claim 11**, *Gill* further discloses wherein the optical interference portion comprises:

an optical splitting portion (Fig. 3, 303) for splitting the input optically angle modulated signal into two,

an optical delay portion (305) for supplying a predetermined optical delay amount to one or both of the optically angle modulated signals that are split and output from the optical splitting portion and outputting a result, and

an optical combining/splitting (309) portion for combining the other optically angle modulated signal that is split and output from the optical splitting portion and an optically angle modulated signal that is output from the optical delay portion and splitting a result into two again so as to output optical differential signals having opposite polarities to each other.

The suggestion/motivation is the same as that used in the rejection for claim 10.

6. **Claims 9 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. and U.S. Patent 7,277,647 B2 to Gill et al.,

as applied to claims 8 and 11 above, and further in view of U.S. Patent 6,574,022 B2 to Chow et al. (*Chow.*)

As to **Claim 9 and 12**, *Chow* discloses wherein the predetermined optical delay amount is smaller than one bit width of the pulse train (Col. 10, ll. 18-20.)

Chow is from the same art with respect to optical communications. Therefore, *Chow* is analogous art.

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to use an optical delay less than on bit width in an optical receiver. The suggestion/motivation would have been to enhance detection reliability (Col. 10, ll. 12-14.)

7. **Claims 13 and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. and U.S. Patent 7,277,647 B2 to Gill et al., as applied to claim 10 above, and further in view of U.S. Patent 5,373,388 to Betts (*Betts.*)

As to **Claim 13**, *Gill* discloses wherein the optical balance detecting portion comprises:

a first optical detecting portion (Fig. 3, top of balanced detector) for reconverting one of the optical differential signals that are output from the optical interference portion to a first differential pulse train, which is an electrical signal, and outputting the signal;

a second optical detecting portion (Fig. 3, bottom of balanced detector) for reconverting the other optical differential signal that is output from the optical

interference portion to a second differential pulse train, which is an electrical signal, and outputting the signal;

Betts discloses a delay portion (Fig. 3, 37) for supplying a predetermined electrical delay amount to the first differential pulse train output from the first optical detecting portion and/or the second differential pulse train output from the second optical detecting portion and outputting a result; and

a combining portion (Fig. 3, 25) for combining the first differential pulse train and the second differential pulse train output from the delay portion to output a bipolar differential pulse train (Fig. 4C.)

Betts is from the same art with respect to optical communications, and therefore is analogous art.

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to delay one output of a balanced receiver. The suggestion/motivation would have been to increase the SNR of the receiver (Col. 1, ll. 45-7.)

As to **Claim 14**, *Gill* discloses an optical splitting portion (Fig. 3, 303) for splitting the input optically angle modulated signal into two,

an optical delay portion (305) for supplying a predetermined optical delay amount to one or both of the optically angle modulated signals that are split and output from the optical splitting portion and outputting a result, and

an optical combining/splitting (309) portion for combining the other optically angle modulated signal that is split and output from the optical splitting

portion and an optically angle modulated signal that is output from the optical delay portion and splitting a result into two again so as to output optical differential signals having opposite polarities to each other.

wherein the optical balance detecting portion comprises:

a first optical detecting portion (Fig. 3, top of balanced detector) for reconverting one of the optical differential signals that are output from the optical interference portion to a first differential pulse train, which is an electrical signal, and outputting the signal;

a second optical detecting portion (Fig. 3, bottom of balanced detector) for reconverting the other optical differential signal that is output from the optical interference portion to a second differential pulse train, which is an electrical signal, and outputting the signal;

Betts discloses a delay portion (Fig. 3, 37) for supplying a predetermined electrical delay amount to the first differential pulse train output from the first optical detecting portion and/or the second differential pulse train output from the second optical detecting portion and outputting a result; and

a combining portion (Fig. 3, 25) for combining the first differential pulse train and the second differential pulse train output from the delay portion to output a bipolar differential pulse train (Fig. 4C.)

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to delay one output of a balanced receiver. The

suggestion/motivation would have been to increase the SNR of the receiver (Col. 1, ll. 45-7.)

8. **Claim 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al., U.S. Patent 7,277,647 B2 to Gill et al., and U.S. Patent 5,373,388 to Betts, as applied to claim 10 above, and further in view of U.S. Patent 6,574,022 B2 to Chow et al.

As to **Claim 15,** *Chow* and *Betts* disclose optical domain and electrical domain delay in optical receivers. A person of ordinary skill in the art could have used optical and electrical domain delay in an optical receiver with predictable results. The selection of the actual amount of delay would have been a matter of design. Therefore, it would have been obvious, at the time of the invention, for a person of ordinary skill in the art to use equal electrical and optical delay.

9. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. in view of U.S. Patent 6,823,141 B2 to Miyauchi et al. (*Miyauchi.*)

As to **Claim 16**, *Chung* discloses wherein the pulse train generating means (Fig. 5) comprises a pulse train generating portion (1213) for converting the data signal input (1011) to a pulse train based on the predetermined encoding pattern (1212), and outputting the pulse train,

and the optical modulating (1214) means comprises an optical modulating portion for converting the pulse train output from the pulse train generating portion to an optically intensity modulated signal and outputting the signal (151),

Miyauchi discloses the optical transmission system further comprises a wavelength dispersing portion (Fig. 2, 7) that has wavelength dispersion characteristics and receives the optically intensity modulated signal transmitted on the optical transmission path (2), compresses a pulse width of a pulse train or a synthesized signal (Col. 5, ll. 45-6), which is modulation information, or reduces a rising time and/or a falling time of the pulse train, and outputting a result,

wherein the optical detecting means comprises:

an optical detecting portion (8) for converting an optical signal output from the wavelength dispersing portion to an electrical signal and outputting the signal.

Miyauchi is from the same art with respect to optical communications, and therefore is analogous art.

At the time of the invention it would have been obvious for a person of ordinary skill in the art to use a wavelength dispersing portion before an optical receiver. The suggestion/motivation would have been to compensate for the dispersion effects of the transmission path (Col. 3, ll. 23-4.)

10. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. and U.S. Patent 6,823,141 B2 to Miyauchi et al., as applied to claim 16 above, and further in view of U.S. Patent 5,315,426 to Aoki (*Aoki.*)

As to **Claim 17**, *Aoki* discloses wherein the optical modulating portion uses a directly optical modulation scheme in which a current injected to a semiconductor laser is modulated with an input pulse train to output an optically intensity modulated signal (Col. 1, ll. 10-26.)

Aoki is from the same art with respect to optical communications, and therefore is analogous art.

At the time of the invention, a person of ordinary skill in the art could have used direct modulation of a semiconductor laser to produce an intensity modulated signal with know methods and predictable results. Therefore, it would have been obvious to directly modulate a semiconductor laser with coded pulse streams disclosed by *Chung*.

11. **Claim 23** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. in view of U.S. Patent 4,942,568 to Khoe et al. (*Khoe*.)

As to **Claim 23**, *Khoe* discloses a wavelength control portion (Fig. 1, control circuits) for controlling such that wavelengths of optically modulated signals output from the plurality of optical modulating portions do not overlap each other (Col. 1, ll. 37-44.)

Khoe is from the same art with respect to optical communications, and therefore is analogous art.

At the time of the invention it would have been obvious for a person of ordinary skill in the art to use a wavelength controller in an optical communication system. The suggestion/motivation would have been to prevent confusion in the receivers (Col. 1, ll. 41-44.)

12. **Claim 24** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. in view of U.S. Patent Application Publication 2003/0026199 A1 to Myers (*Myers*.)

As to **Claim 24**, further discloses wherein the pulse train generating means comprises a plurality of pulse train generating portions (Fig. 1, see multiple transmitters) for converting a plurality of data signals to respective pulse trains that are of predetermined modulation types, based on encoding patterns each of which is predetermined corresponding to the data signals input and is different from one another (Each code is orthogonal, thus unique), and outputting the pulse train, and

Myers discloses wherein the optical modulating means comprises:

a synthesizing portion (Fig. 1, 40, 42) for outputting an electrical signal obtained by synthesizing pulse trains output from the plurality of pulse train generating portions, and

an optical modulating portion (Fig. 1, 56a, 56b) for converting the electrical signal output from the synthesizing portion to an optically modulated signal and outputting the signal.

Aoki is from the same art with respect to optical communications, and therefore is analogous art.

At the time of the invention, it would have been obvious synthesize the individual coded data streams in the electrical domain and then optically modulate them. The suggestion/motivation would have been to reduce the number of light sources and modulators needed.

13. **Claim 28** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. and U.S. Patent Application Publication 2003/0026199

A1 to Myers as applied to claim 24 above, and further in view of U.S. Patent 6,791,734 B2 to Izadpanah (*Izadpanah.*)

As to **Claim 28**, *Izadpanah* discloses a way to send variable rate signals. The signals can be modulated at sub-harmonic integer numbers of the fundamental frequency (Col. 8, ll. 42-7.) Assuming *Chung* operates at 100Mhz, a 50Mhz data signal of "1011" would just be interpreted as "11001111." Once treated in this fashion, the lower rate signal is passed through the system in the same fashion as the other signals. Thus, the system disclosed by *Chung* would be modified to send signals of a lower rate using know methods and with predictable results. Therefore it would have been obvious at the time of the invention to modify *Chung* to allow lower rate signals to be transmitted.

14. **Claim 29** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. and U.S. Patent Application Publication 2003/0026199 A1 to Myers as applied to claim 24 above, and further in view of U.S. Patent 6,823,141 B2 to Miyauchi et al.

As to **Claim 29**, *Miyauchi* discloses a pulse compressing portion (Fig. 2, 7)for receiving the optically intensity modulated signal transmitted in the transmission path, compressing a pulse width of a pulse train (Col. 5, ll. 44-5), which is modulation information, or reducing a rising time and/or a falling time of the pulse train, and outputting a result,

wherein the optical detecting means comprises:

an optical detecting portion (Fig. 2, 8) for converting an optical signal output from the pulse compressing portion to an electrical signal and outputting the signal.

At the time of the invention it would have been obvious for a person of ordinary skill in the art to use a wavelength dispersing portion before an optical receiver. The suggestion/motivation would have been to compensate for the dispersion effects of the transmission path (Col. 3, ll. 23-4.)

15. **Claim 30** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. and U.S. Patent Application Publication 2003/0026199 A1 to Myers as applied to claim 24 above, and further in view of U.S. Patent Application Publication 2004/0066856 A1 to Forestieri et al.

As to **Claim 30**, *Forestieri* discloses a filter portion (Fig. 2 LPF) that is provided between each of the pulse train generating portions and the synthesizing portion and increases a pulse width of the pulse train output from the pulse train generating portion (the bandpass filter rejects the low frequency components of the signal, thus decreasing the rise/fall time), or increases a rising time and/or and-a falling time of the pulse train and outputs a result, and

a pulse compressing portion (Fig. 3, BPF) for receiving the optically intensity modulated signal transmitted in the transmission path, compressing a pulse width of a pulse train, which is modulation information, or reducing a rising time and/or a falling time of the pulse train, and outputting a result,

wherein the optical detecting means comprises:

an optical detecting portion (Fig. 3, Detector) for converting an optical signal output from the pulse compressing portion to an electrical signal and outputting the signal.

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to spread the transmitted pulse and compress the received pulse. The suggestion/motivation would have been to combat the effects of chromatic dispersion (¶ 3.)

16. **Claims 31,32,34, and 35** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. and U.S. Patent Application Publication 2003/0026199 A1 to Myers as applied to claim 24 above, and further in view of U.S. Patent 7,277,647 B2 to Gill et al.

As to **Claim 31**, *Gill* discloses wherein the optical modulating means (Fig. 1, 103) comprises an optical angle modulating portion for converting the pulse train output from the pulse train generating portion to an optically angle modulated signal and outputting the signal (Fig. 3, shows that the phase of the signal is modulated, phase modulation being a type of angle modulation,)

the optical detecting means (Fig. 1, 130) comprises:

an optical interference portion (Fig. 1, 132) for receiving an optically angle modulated signal transmitted on the optical transmission path and detecting correlation between adjacent bits of a pulse train (Col. 5, ll. 38-60,) which is modulation information, so as to output two optical differential signals that have

opposite polarities to each other and correspond to differential components of the pulse train (Fig. 3, signal I1 and I2,) and

an optical detecting portion (Fig. 1, balanced detector) for converting one of the optical differential signals that are output from the optical interference portion to an electrical signal and outputting the signal.

At the time of the invention it would have been obvious for a person of ordinary skill in the art to angle modulate the transmission signal and to use an interference portion to receive the signal. The suggestion/motivation would have been to take advantage of the benefits of minimum shift keying or phase shift keying (Col. 1, ll. 45-60.)

As to **Claim 32**, *Gill* further discloses wherein the optical interference portion comprises:

an optical splitting portion (Fig. 3, 303) for splitting the input optically angle modulated signal into two,

an optical delay portion (305) for supplying a predetermined optical delay amount to one or both of the optically angle modulated signals that are split and output from the optical splitting portion and outputting a result, and

an optical combining/splitting (309) portion for combining the other optically angle modulated signal that is split and output from the optical splitting portion and an optically angle modulated signal that is output from the optical delay portion and splitting a result into two again so as to output optical differential signals having opposite polarities to each other.

The suggestion/motivation is the same as that used in the rejection for claim 31.

As to **Claim 34**, *Gill* discloses wherein the optical modulating means (Fig. 1, 103) comprises an optical angle modulating portion for converting the pulse train output from the pulse train generating portion to an optically angle modulated signal and outputting the signal (Fig. 3, shows that the phase of the signal is modulated, phase modulation being a type of angle modulation,)

the optical detecting means (Fig. 1, 130) comprises:

an optical interference portion (Fig. 1, 132) for receiving an optically angle modulated signal transmitted on the optical transmission path and detecting correlation between adjacent bits of a pulse train (Col. 5, ll. 38-60,) which is modulation information, so as to output two optical differential signals that have opposite polarities to each other and correspond to differential components of the pulse train (Fig. 3, signal I1 and I2,) and

an optical balance detecting portion (Fig. 3, balanced receiver) for reconverting the two optical differential signals that are output from the optical interference portion to respective electrical signals and for combining the two signals so as to generate and output a bipolar differential pulse train (Col. 5, ll. 60-3.)

At the time of the invention it would have been obvious for a person of ordinary skill in the art to angle modulate the transmission signal and to use an interference portion with a balanced receiver to receive the signal. The

suggestion/motivation would have been to take advantage of the benefits of minimum shift keying or phase shift keying (Col. 1, ll. 45-60.)

As to **Claim 35**, *Gill* further discloses wherein the optical interference portion comprises:

an optical splitting portion (Fig. 3, 303) for splitting the input optically angle modulated signal into two,

an optical delay portion (305) for supplying a predetermined optical delay amount to one or both of the optically angle modulated signals that are split and output from the optical splitting portion and outputting a result, and

an optical combining/splitting (309) portion for combining the other optically angle modulated signal that is split and output from the optical splitting portion and an optically angle modulated signal that is output from the optical delay portion and splitting a result into two again so as to output optical differential signals having opposite polarities to each other.

The suggestion/motivation is the same as that used in the rejection for claim 34.

17. **Claims 33 and 36** rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al., U.S. Patent Application Publication 2003/0026199 A1 to Myers, and U.S. Patent 7,277,647 B2 to Gill et al., as applied to claim 32 above, and further in view of U.S. Patent 6,574,022 B2 to Chow et al. (*Chow.*)

As to **Claims 33 and 36**, *Chow* discloses wherein the predetermined optical delay amount is smaller than one bit width of the pulse train (Col. 10, ll. 18-20.)

Chow is from the same art with respect to optical communications. Therefore, *Chow* is analogous art.

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to use an optical delay less than on bit width in an optical receiver. The suggestion/motivation would have been to enhance detection reliability (Col. 10, ll. 12-14.)

18. **Claims 37 and 38** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al., U.S. Patent Application Publication 2003/0026199 A1 to Myers, and U.S. Patent 7,277,647 B2 to Gill et al., as applied to claim 34 above, and further in view of U.S. Patent 5,373,388 to Betts.

As to **Claim 37**, *Gill* discloses wherein the optical balance detecting portion comprises:

a first optical detecting portion (Fig. 3, top of balanced detector) for reconverting one of the optical differential signals that are output from the optical interference portion to a first differential pulse train, which is an electrical signal, and outputting the signal;

a second optical detecting portion (Fig. 3, bottom of balanced detector) for reconverting the other optical differential signal that is output from the optical

interference portion to a second differential pulse train, which is an electrical signal, and outputting the signal;

Betts discloses a delay portion (Fig. 3, 37) for supplying a predetermined electrical delay amount to the first differential pulse train output from the first optical detecting portion and/or the second differential pulse train output from the second optical detecting portion and outputting a result; and

a combining portion (Fig. 3, 25) for combining the first differential pulse train and the second differential pulse train output from the delay portion to output a bipolar differential pulse train (Fig. 4C.)

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to delay one output of a balanced receiver. The suggestion/motivation would have been to increase the SNR of the receiver (Col. 1, ll. 45-7.)

As to **Claim 38**, *Gill* discloses an optical splitting portion (Fig. 3, 303) for splitting the input optically angle modulated signal into two,

an optical delay portion (305) for supplying a predetermined optical delay amount to one or both of the optically angle modulated signals that are split and output from the optical splitting portion and outputting a result, and

an optical combining/splitting (309) portion for combining the other optically angle modulated signal that is split and output from the optical splitting portion and an optically angle modulated signal that is output from the optical

delay portion and splitting a result into two again so as to output optical differential signals having opposite polarities to each other.

wherein the optical balance detecting portion comprises:

a first optical detecting portion (Fig. 3, top of balanced detector) for reconverting one of the optical differential signals that are output from the optical interference portion to a first differential pulse train, which is an electrical signal, and outputting the signal;

a second optical detecting portion (Fig. 3, bottom of balanced detector) for reconverting the other optical differential signal that is output from the optical interference portion to a second differential pulse train, which is an electrical signal, and outputting the signal;

Betts discloses a delay portion (Fig. 3, 37) for supplying a predetermined electrical delay amount to the first differential pulse train output from the first optical detecting portion and/or the second differential pulse train output from the second optical detecting portion and outputting a result; and

a combining portion (Fig. 3, 25) for combining the first differential pulse train and the second differential pulse train output from the delay portion to output a bipolar differential pulse train (Fig. 4C.)

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to delay one output of a balanced receiver. The suggestion/motivation would have been to increase the SNR of the receiver (Col. 1, ll. 45-7.)

19. **Claim 39** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al., U.S. Patent Application Publication 2003/0026199 A1 to Myers, U.S. Patent 7,277,647 B2 to Gill et al., and U.S. Patent 5,373,388 to Betts as applied to Claim 38, and further in view of U.S. Patent 6,574,022 B2 to Chow et al.

As to **Claim 39,** *Chow* and *Betts* disclose optical domain and electrical domain delay in optical receivers. A person of ordinary skill in the art could have used optical and electrical domain delay in an optical receiver with predictable results. The selection of the actual amount of delay would have been a matter of design. Therefore, it would have been obvious, at the time of the invention, for a person of ordinary skill in the art to use equal electrical and optical delay.

20. **Claim 40** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. and U.S. Patent Application Publication 2003/0026199 A1 to Myers as applied to claim 24 above, and further in view of U.S. Patent 6,823,141 B2 to Miyauchi et al.

As to **Claim 40**, *Chung* discloses wherein the optical modulating portion (Fig. 5) converts the pulse train output from the pulse train generating portion to an optically intensity modulated signal (Fig. 5, 1214, on off transmission) and outputs the signal,

Miyauchi discloses the optical transmission system further comprises a wavelength dispersing portion (Fig. 2, 7) that has wavelength dispersion characteristics and receives the optically intensity modulated signal transmitted on the optical transmission path (2), compresses a pulse width of a pulse train or

a synthesized signal (Col. 5, ll. 45-6), which is modulation information, or reduces a rising time and/or a falling time of the pulse train, and outputting a result,

wherein the optical detecting means comprises:

an optical detecting portion (8) for converting an optical signal output from the wavelength dispersing portion to an electrical signal and outputting the signal.

At the time of the invention it would have been obvious for a person of ordinary skill in the art to use a wavelength dispersing portion before an optical receiver. The suggestion/motivation would have been to compensate for the dispersion effects of the transmission path (Col. 3, ll. 23-4.)

21. **Claim 41** is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al., U.S. Patent Application Publication 2003/0026199 A1 to Myers, and U.S. Patent 6,823,141 B2 to Miyauchi et al., as applied to claim 40 above, and further in view of U.S. Patent 5,315,426 to Aoki (*Aoki*.)

As to **Claim 41**, *Aoki* discloses wherein the optical modulating portion uses a directly optical modulation scheme in which a current injected to a semiconductor laser is modulated with an input pulse train to output an optically intensity modulated signal (Col. 1, ll. 10-26.)

Aoki is from the same art with respect to optical communications, and therefore is analogous art.

At the time of the invention, a person of ordinary skill in the art could have used direct modulation of a semiconductor laser to produce an intensity modulated signal with know methods and predictable results. Therefore, it would

have been obvious to directly modulate a semiconductor laser with coded pulse streams disclosed by *Chung*.

22. **Claims 22, 42, and 43** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,779,266 to Chung et al. in view of U.S. Patent 6,791,734 B2 to Izadpanah (*Izadpanah.*)

As to **Claim 22**, *Izadpanah* discloses a way to send variable rate signals. The signals can be modulated at sub-harmonic integer numbers of the fundamental frequency (Col. 8, ll. 42-7.) Assuming *Chung* operates at 100Mhz, a 50Mhz data signal of "1011" would just be interpreted as "11001111." Once treated in this fashion, the lower rate signal is passed through the system in the same fashion as the other signals. Thus, the system disclosed by *Chung* would be modified to send signals of a lower rate using know methods and with predictable results. Therefore it would have been obvious at the time of the invention to modify *Chung* to allow lower rate signals to be transmitted.

As to **Claim 42**, *Izadpanah* discloses wherein a modulation type of a pulse train converted by the pulse train generating means is a pulse position modulation type. (Col. 8, ll. 56-67.)

A person of ordinary skill in the art could have modulated the pulse train by pulse position modulation using know methods and with predictable results. Therefore, it would have been obvious at the time of the invention to use PPM.

As to **Claim 43**, *Izadpanah* wherein a pulse train obtained by the data signal extracting means is an UWB (Ultra Wide Band) signal. (Col. 5, ll. 51-7.)

A person of ordinary skill in the art could sent and received UWB signals using know methods and with predictable results. Therefore, it would have been obvious at the time of the invention to transmit and receive UWB signals.

Conclusion

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 7,167,651 B2 to Shpantzer et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel G. Dobson whose telephone number is (571) 272-9781. The examiner can normally be reached on Mon. - Fri. 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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DGD

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